AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

Claims 1-11 (canceled).

12. (Previously Presented): A stand alone receive system capable of minimizing affects of thermal noise introduced by the amplification of a signal, said system comprising:

a single stand-alone array antenna operable to receive a plurality of overall receive signals;

an amplifier operable to amplify each of said overall receive signals;

an analog to digital converter operable to convert said overall receive signals from an analog format to digital values;

a storage device capable of storing said digital values and operable to create a matrix comprising a plurality of rows and columns wherein said rows and columns contain information based on said digital values;

a processor operable to iteratively process said digital values to determine said information and place said information in locations within said matrix;

a phase multiplier operable to multiply signal-only data from said processor with a plurality of phase values and output phase multiplied data; and

a combiner operable to combine said phase multiplied data.

13. (Previously Presented): A receive system according to claim 12 further comprising;

a local oscillator operable to generate a reference signal; and

a mixer operable to heterodyne said reference signal with said overall receive signals to generate a lower frequency version of said overall received signals.

14. (Previously Presented): A stand alone receive system according to claim 12, wherein a zero phase reference is established for a carrier signal that is synchronized to an internal system timing generator from which reference in-phase (I) and quadrature (Q) components are established rapidly, said I and Q components being processed independently over a relatively wide bandwidth.

15. (Previously Presented): A receive system according to claim 12 wherein said analog to digital converter is further operable to separately generate digital in-phase and quadrature samples of said overall receive signals wherein said quadrature samples are approximately 90 degrees out of phase with respect to said in-phase samples.

16. (Previously Presented): A stand alone receive system according to claim 12 wherein said antenna comprises a two-dimensional array of elements grouped into a plurality of corresponding right-left groups, each right-left group being centered around a center group wherein each of said elements is spaced an integer multiple of a half-wavelength from a respective adjacent element, such an arrangement being suitable for providing signal outputs accomplished by a non-phase dispersive multiplying function.

17. (Previously Presented): A stand alone receive system according to claim 12 wherein in-phase (I) and quadrature (Q) signal processing effectively removes any affects of an inherent signal phase, Beta, and an electrical phase angle, phi, is obtained that corresponds to a physical angle, theta, which is approximately equal to a phase difference between a normal to the antenna and a receive angle of said overall receive signals, to measure the electrical phase angle, phi, of said receive signal with high precision as a result of achieving low phase dispersion when multiplied.

18. (Previously Presented): A receive system according to claim 12 wherein said phase multiplier multiplies a phase difference, phi, by a plurality of integers, said phase difference being the difference between a real phase of said received signals and a theoretical phase of said received signals, said theoretical phase being determined

from a receive angle of said overall receive signals and wherein said phase multiplication is accomplished without significant phase dispersal caused by noise.

19. (Previously Presented): A stand along receive system according to claim 12 wherein a plurality of outputs from said phase multiplier that experience negligible phase dispersion because of the absence of noise are coherently combined to increase an angular sensitivity of the receive system.

20. (withdrawn): A method of improving the directivity of a receive system, said method comprising the steps of:

receiving receive signals from an antenna array, said antenna array comprising a plurality of elements;

amplifying said receive signals to form amplified signal-plus-noise signals;

determining a phi-phase equivalent to a difference between a reference phase and a phase of said amplified signal-plus-noise signals;

forming in-phase and quadrature versions of said amplified signal-plus-noise signals by subtracting said phi-phase from said phase of said amplified signal-plus-noise signals to form said in-phase version and adding or subtracting about ninety degrees from said in-phase version to form said quadrature version;

determining a phase difference between respective receive signals received from adjacent elements of said antenna array and an amplitude of said receive signal received from each element of said antenna array;

multiplying said phase difference by each of a series of integers to create a plurality of outputs;

summing said outputs coherently to form an improved overall output with an improved sensitivity substantially greater than a normal sensitivity of said receive signals; and

computing the arctangent of a noise reduced quadrature signal divided by a noise reduced in-phase signal to constitute an angle, phi, of the signal.

21. (withdrawn): A method for increasing the signal to noise ratio of a receive system, said method comprising the steps of:

receiving receive signals from an antenna array, said antenna array comprising a plurality of elements;

amplifying said receive signals to form amplified signal-plus-noise signals;

creating in-phase and quadrature versions of said receive signals wherein said in-phase and quadrature versions are about ninety degrees out of phase with respect to each other;

determining an average noise and an average signal of said amplified signal-plus-noise signals;

forming separate matrices each associated with either said in-phase or said quadrature versions of said receive signal, said matrices digitally representing a plurality of values, said values consisting of said in-phase or quadrature versions of said receive signals received from each element and a deviation of said in-phase or quadrature versions of said receive signals from said average noise; and

selecting an amplified signal-plus-noise signal with a minimum deviation from said average noise; and performing an iterative process on data contained in said matrices to determine an estimate of the magnitude and polarity of the noise portion of the signal plus noise for each trial.

22. (withdrawn): The method according to claim 21, further comprising the steps of:

storing and delaying the receive signals;

calculating an estimate of a noise-only portion of in-phase and quadrature components of said receive signal by using a converging iterative process to obtain an in-phase noise estimate and a separate quadrature noise estimate; and

subtracting said noise-only portion of said receive signal from delayed signals to form a signal-only portion of said receive signal.

23. (currently amended): An iterative processing method used in conjunction with a ~~A~~ stand alone receive system comprising an antenna array with two interoperable arrangements of elements, said antenna array operable to provide signal-plus-noise outputs to ~~an~~ the iterative processing method, ~~that~~ which does not require additional external augmentation and does not depend on polarization discrimination, ~~;~~

said iterative processing method ~~being capable of;~~comprising:

achieving dramatic signal-to-noise ratio improvement;

improving the ability to distinguish weak signals received by said antenna array, and

improving angular ~~discrimination by sharpening a beam of said antenna array~~resolution to discriminate against near-beam-edge directions,

wherein said angular ~~discrimination~~ resolution is improved by a phase multiplying process using two or more groups of said receive signals, in which the noise has been reduced to permit non-dispersive phase multiplication, each group being physically displaced from the other groups by having a ~~separation~~ phase center separated from other groups by multiples of one-half ~~of different numbers of half wavelengths~~wavelength.

24. (Previously Presented): A method of improving an angular resolution in a stand alone receive system, said method comprising aggregating signal-plus-noise data output from an antenna into a plurality of groups, each group containing data having a similar phase, wherein the phase corresponding to each group is a multiple of the phase corresponding to the other groups, said multiple being determined by a spacing between right and left elements of each group from the center of the antenna array and wherein further, said groups are formed by combining data from respective right and left antenna elements and said right and left antenna elements are equidistant from a central common reference located at a center of the array of elements and corresponding to a phase angle, phi, of zero phase.

Claim 25 (canceled).

26. (Previously Presented): A method as claimed in claim 24, said method further comprising the steps of:

iteratively processing the data in said group to reduce a noise portion of a signal plus noise average to determine a relatively noise-free representation of the angle, phi, associated with an arrival direction of the signal from said group by aggregating the modified Q's and aggregating the I's so as to be able to divide the overall digital net

values of the plus and minus Q's by the net in-phase values I so as to determine the angle from the arctangent of each Q/I quotient.

27. (Previously Presented): A method as claimed in claim 24, said method further comprising the steps of:

phase multiplying said angle, phi, from each group; with negligible phase dispersion caused by noise; and

processing the resulting vectors from the phase multiplying step from all of the groups in order to provide improved angular discrimination against signals from unwanted angle directions outside a resultant sharpened beam.

28. (Previously Presented): A method as claimed in claim 26, wherein said iterative processing step includes the step of sequentially applying a series of digital values to said data to alter a value representing signal plus noise with the result of each iteration to obtain an estimate of a noise portion of the signal plus noise by algebraically summing values of the several iterative steps.

29. (Previously Presented): A method as claimed in claim 26, wherein said iterative processing step includes;

sensing, in a bipolar manner, a change in the data, caused during each iteration,

wherein a magnitude of the change is determined equally for both plus and minus values of the noise component of the signal-plus-noise samples in a symmetrical bipolar manner and the result of each iterative value applied is assessed to determine the next subsequent value in a way that constitutes an overall feedback system with the signal held at a constant level for two or more successive trials.

30. (withdrawn): A process for substantially improving the signal to noise ratio of a receive system, said process comprising the step of:

iteratively converging on an estimate of a noise-only portion of received signals plus noise for both in-phase and quadrature components of said received signals plus noise by simultaneously obtaining said noise-only estimates from a net algebraic sum of a series of iterations which provides a close approximations to the magnitude of the noise for each trial, and of opposite polarity;

reducing the actual noise of said received signals plus noise by subtracting said close approximations from said received signals plus noise.

31. (withdrawn): The process for substantially improving the signal to noise ratio of a receive system claimed in claim 30, said process further comprising the steps of:

storing selected signal plus noise data;

comparing said noise-only estimates of each iteration of each trial from each group and using a result of said comparison to remove most of the noise from each signal plus noise value that was stored in said storing and delaying steps.

32. (withdrawn): The process claimed in claim 31, wherein the signal plus noise is sampled at the carrier rate and the total iterative process of several iterations is accomplished at a rate to achieve non real-time performance.

33. (withdrawn): The process claimed in claim 32, wherein a bandwidth and a signal handling capability of said receive system are not adversely compromised but rather the process results in a known delay from real time, wherein the predetermined delay is dependent upon the selection of an appropriate processing speed and the fixed delay time is utilized as a processing time to improve the signal-to-noise ratio of said system.

34. (Previously Presented): A receive system comprising;

an antenna array with right and left side elements operable to receive signal-plus-noise signals;

a means for aggregating outputs of selected right and left side elements of said antenna array to form an aggregation of signal-plus-noise voltages in digital form, said digital values being used to modify a topological number array (TNA) in several steps to form a near real time estimate of the noise for each trial; and

a processor operable to identify a particular entry of a subset of said aggregation that has the least absolute deviation from an average of the subset,

wherein said identified entry represents an entry whose noise is closest to the average noise component of the signal plus noise average of the aggregate group.

Claim 35 (canceled).

36. (Previously Presented): The receive system as claimed in claim 34 wherein said subset includes separate in-phase (I) and quadrature (Q) voltage outputs and provides the signal and noise in a first row of a two row numerical array of digital numbers with a second row consisting of the signal plus noise average for each of the separate I and Q aggregations.

37. (Previously Presented): The receive system as claimed in claim 36 further comprising:

a modification device operable to modify the signal plus noise outputs of said two row numerical array, wherein said modification is performed by adding progressive and contiguous predetermined values both plus and minus over a pertinent range so that a relatively large number of different entries are formed that constitute columns of a matrix containing an array of numbers in which each column corresponds to a plus or minus value of the added or injected value whose polarity is opposite to that of the noise, and wherein further, the total array provides a topological representation or map of the totality of appropriate signal plus noise values as segregated by column location for each row.

38. (Previously Presented): A stand alone receive system comprising;

single antenna array with right and left side elements operable to receive signal-plus-noise signals;

a deviation determining device operable to select datapoints, representing data from each of said antenna array elements, and arrange said datapoints in a sextet, octet or other evenly distributed group for each in-phase (I) and quadrature (Q) representation of said signal-plus-noise signal,

wherein said deviation determining device determines a deviation for each individual datapoint of said sextet, octet or other evenly distributed group, from the average of each group to determine which datapoint constitutes a minimum absolute

value of said deviations from said average, said deviation and said average being used to form a topological map of numbers that correspond to modified numbers produced by adding pre-programmed values to said data.

39. (Previously Presented): A method of processing signals received by a receiving system, said method comprising:

forming left and right topological groupings of a topological number array of digital representations of said signals, said groupings formed about a topocentric reference of the two groupings that corresponds to a zero value injection from a stored predetermined value injection pattern comprised of positive and negative steps, which are incrementally increasing in magnitude, in each of two or more rows of similar increments having a common topocentric zero reference.

40. (Previously Presented): A method of processing signals received by a receiving system according to claim 39, wherein said increasing positive and negative steps are associated with said groupings in reverse order, from minus to plus in one of the two, or more, rows to provide polarity senses that are opposite to each other to sharpen an error response of column entry comparisons.

41. (Previously Presented): A method of processing signals received by an array of a receiving system, said method comprising;

configuring a numerical array of modified signal-plus-noise values representative of said received signals such that each noise portion of said signal-plus-noise value transitions through zero at a location in the array, said location being determined by the polarity and magnitude of said noise; and

sensing how the injection of a programmed iterative value will change a relative location within said array by sensing, in progressive steps, when each injected iterative value causes a match in the numerical values of signal-plus-noise from two rows of the numerical array to be further from, or closer to, a topocentric center of left and right portions of the array.

42. (Previously Presented): The method according to claim 41, further comprising:

providing equilibrium about a center of the array; and

sensing iterative changes in a symmetrical fashion in said modified signal-plus-noise values by using plus or minus deviations nearest to the average,

wherein said equilibrium is achieved by imposing left or right incremental column shifts in the row corresponding to a plus or minus deviation nearest to the average and

wherein said incremental shift corresponds to said deviation in terms of an incremental shift.

43. (Previously Presented): A method according to claim 42, wherein said left or right incremental shifts in said average row and said row corresponding to a plus or minus deviation nearest to the average are reversed with respect to each other in two pertinent rows.

44. (Previously Presented): A method according to claim 42 further comprising:

producing a sequence of controlled steps to create a series of discrete voltage values using an iterative program in which each value alters the signal plus noise value to create a new signal plus noise value for each entry of both left and right portions of the topographical numerical array.

45. (Previously Presented): A method according to claim 44 further comprising:

sensing how each iterative step alters the entries of selected rows of the topographical digital numerical array; and

determining when a numerical match of values occurs between various columns of said array.

46. (Previously Presented): A method according to claim 45 further comprising:

reading a column entry from the average row and the column in another row, different from said average row, that has been shifted by an amount equal to the algebraic sum of the minimum deviation value together with a left or right shift furnished as part of an instruction from said iterative program.

47. (Previously Presented): A method according to claim 45 further comprising:

establishing an initial reference at a zero column at a topocenter of the topological numerical array for the first iteration and thereafter using a resulting column location for each succeeding iteration to constitute the next reference column for each succeeding iteration.

48. (Previously Presented): A method according to claim 47 further comprising:

determining in a bipolar manner when the polarity of the noise portion of a signal plus noise combination changes sign in response to a predetermined value injection; and

sensing deviations in the noise in the absence of knowledge regarding the polarity of the noise prior to said value injection,

wherein said method is accomplished through use of a topographic digital number array that covers a plus and minus range and is in equilibrium about its topocentric value, which is zero.

49. (Previously Presented): A method according to claim 48 further comprising:

iteratively processing said signals by employing the bipolar sensing property to respond to a series of programmed voltage injections, each voltage injection corresponding to a digital number, as provided by an iterative program that results in a process that converges in decreasing increments,

wherein an algebraic sum of appropriate amounts from each closed loop iterative voltage provides an equivalent noise voltage, which approximates an actual noise voltage portion for each signal plus noise sample.

50. (Previously Presented): A method according to claim 49 further comprising:

deriving an array of numbers by supplying a prescribed series of contiguous numbers that progressively alter an average of signal plus noise values of said received signals to provide a topographical map of numbers;

determining, from said topographical map of numbers when a noise portion of said signal plus noise values changes, or comes closer to changing its polarity, in

response to an additional executed change in the form of column displacement or shift as provided by the iterative sequencing program; and

repeating said deriving and determining procedures while storing original signal plus noise values; and

initially matching the numerical value in the shifted column with that of the zero column and after each successive iterative step, matching the numerical value with an entry in a new column with that of the new "average" row column that results from the preceding step.

51. (Previously Presented): A method in accordance with claim 50,

wherein a response to the prior applied value step that results in a left or right column shift is a basis for the next step; and wherein further,

if said response is closer to zero, a step of the same polarity (or column shift) and of equal or diminished amount is used in the process; and

if the average row match has changed from one side of the topocentric or zero column to the opposite side, then a value with a polarity opposite to the polarity used in the previous step and reduced in amount is used in the process.

52. (Previously Presented): A method in accordance with claim 51, wherein each of said iterations forms a basis for a next iteration until successive iterations achieve an unlocking of information in the form of an estimate of an amount of unwanted noise.

53. (withdrawn): A method in accordance with claim 22,

wherein the entropy of said receive system is improved by said iterative processing by providing increased order to the stored values that have been corrupted by noise and wherein an amount of said noise corruption is closely estimated by a converging process that converges in steps to yield an approximation thereby permits an improved signal-to-noise ratio to be attained for each sample.

54. (withdrawn): A method according to claim 53, wherein said converging iterative process comprises:

delaying and storing the received signals to maintain the signal portion of the signals constant and wherein the variations that occur from one iteration to a next iteration consist primarily of changes in the noise portion of the signal.

55. (Previously Presented): A method according to claim 46 further comprising:

holding a receive signal constant during a frame in time by using a memory device,

wherein said frame in time consists of a sum of several iteration times so that successive signal frames provide a noise-reduced modulated signal.

56. (Previously Presented): A method in accordance with claim 55 wherein each successive sample has the benefit of several iterations and accommodates modulation of various different signals for different applications and wherein a continuing sequence of frames of information is provided which comprise desired segments of a modulated signal with a noise portion of said modulated signal reduced and a desired modulated signal values are provided by a series of said frames of information.

57. (withdrawn): An integrated circuit device operable to perform an iterative processing method, said device comprising:

means for injecting a series of predetermined digital values supplied by an Electrically Programmable Read Only Memory (EPROM);

means for storing new digital values resulting from said injection of digital values, said stored new digital values constituting a stored topographical number matrix in which two, or more, rows accommodate each of a plurality of trials of each of a plurality of iterative steps and wherein each iterative step introduces a number probe which

causes a relative displacement between two rows, each of which contains column information, to afford an opportunity to match the stored entry values in two appropriate columns by a digital number comparator.

58. (withdrawn): A device according to claim 57 wherein the polarity and magnitude of a next iterative probe are determined to control a next iterative result and the algebraic sum of said probes values provides an accurate estimate of the polarity and magnitude of the noise portion of each separate iterative signal-to-noise sample thereby allowing the noise to be subtracted from the delayed signal-plus-noise input to yield an enhanced signal with reduced noise.

59. (withdrawn): A device according to claim 58 wherein each frame of signal information is enhanced by several iterative steps that reduce the noise by providing the device with the information such that each iteration results in a noise value that is either closer to, or further from, a topocentric or zero reference of an array consisting of two, or more, rows, wherein one of the rows is displaced, or shifted, in column location by an amount corresponding to a dispersion amount (difference) between a noise average of a sextet or octet that provides the information from an antenna and the average of a similar entry that is closest to the noise average by comparing values in appropriate

columns so that information regarding polarity and magnitude is derived with respect to each of a succession of iterative probes.

60. (withdrawn): A device in accordance with claim 59 further comprising:

means for preserving and executing the number injections, sensing of the results in each of the two (or more) rows of the topographical number array to provide the results of selecting appropriate columns by matching nearly equal numerical column value entries from the two rows and repeating the above process for each iteration, starting each iteration with conditions resulting from the previous iteration.

61. (Previously Presented): An integrated circuit operable to provide frames of information as described in claim 56 to work in one or more pairs to form a parallel processing arrangement in which separate signal frames can be captured and stored simultaneously so that the output of each signal frame can be utilized individually and serially to construct a desired noise-reduced signal by successive frames that provide modulation characteristics of the sequence, wherein said processing arrangement is performed in a relatively short period of time manifested as a signal delay that does not compromise a bandwidth of the system.

62. (Previously Presented): A method according to claim 24 further comprising:

phase-gating of the angle, phi, of the received signal to accept only predetermined desired phases irrespective of random noise affects.

63. (withdrawn): A receive system comprising:

means for achieving multiple simultaneous phase gates, each phase gate encompassing a predetermined segment of angular coverage at different angles corresponding to different signal directions in order to realize stacks of beams in azimuth and/or elevation angles to constitute a cluster of enhanced beams covering multiple directions for reception of the signals.

64. (Previously Presented): A receive system according to claim 34 wherein a receptivity to radio frequency signals provides a signal strength, relative to inherent noise, characteristic that is equivalent to that which is expected from an antenna with a larger aperture, and wherein said signals have improved directivity and angular resolution over a wide range of radio frequencies permitting better utilization of an allocated or an independently chosen frequency spectrum.

65. (withdrawn): A method according to claim 33 further comprising iterative probing with bipolar sensing conducted in non-real-time to improve the entropy of the receive system.

66. (withdrawn): A method according to claim 53 wherein the second law of thermodynamics is satisfied during a known delay from real time and an estimate of the noise portion of the signal plus noise is equivalent to introducing statistical mechanics energy at a lower temperature in a thermal system.

67. (withdrawn): A method for increasing the signal to noise ratio of a receive wireline system, said method comprising the steps of:

receiving receive signals from a wire-line;

amplifying said receive signals to form amplified signal-plus-noise signals;

creating in-phase and quadrature digital versions of said receive signals wherein said in-phase and quadrature versions are about ninety degrees out of phase with respect to each other;

storing said signal-plus-noise signals in a memory device;

forming at least one matrix using said in-phase or said quadrature versions of said receive signal, said matrix digitally representing a plurality of values, said values consisting of said in-phase and quadrature versions of said receive signals;

performing an iterative process on data contained in said matrix to determine an estimate of the magnitude and polarity of the noise portion of the signal plus noise for each trial; and

subtracting each estimated noise value from the stored signal plus noise version to obtain a noise-reduced signal.

68. (withdrawn): A method for increasing the signal to noise ratio of a receive fiber optic wireline system, said method comprising the steps of:

receiving receive signals from a fiber-optic carrier;

amplifying said receive signals to form amplified signal-plus-noise signals;

creating in-phase and quadrature digital versions of said receive signals wherein said in-phase and quadrature versions are about ninety degrees out of phase with respect to each other;

storing said signal-plus-noise signals in a memory device;

forming at least one matrix using said in-phase and said quadrature versions of said receive signal, said matrices digitally representing a plurality of values, said values consisting of said in-phase and quadrature versions of said receive signals;

performing an iterative process on data contained in said matrix to determine an estimate of the magnitude and polarity of the noise portion of the signal plus noise for each trial; and

subtracting each estimated noise value from the stored signal-plus-noise value to obtain a noise reduced signal.

69. (Previously Presented): A stand alone antenna system operable to enhance signal reception capabilities so as to find a signal of unknown magnitude from an unknown direction with only an approximate frequency band being known with such enhancement being achieved without the need to receive any special additional transmitted signals to augment the enhancement process and using a process sequence of steps controlled by an iterative programmer to alter signal plus noise entries into right and left portions of a topographical numerical array so as to sense the consequences and determine the next steps with a logic that converges so that an algebraic sum of the voltage steps yields an estimate of broadband noise for at least two successive trials, in which respective signals are the same, wherein the overall objective is to provide signals that are noise-free so as to be able to multiply a resulting angle of arrival to achieve antenna patterns without phase dispersal consequences.

70. (Previously Presented): A versatile stand alone antenna and receiving system as set forth in claim 69, further comprising a sequence of steps as controlled by the iterative programmer to create a series of digital values representing discrete voltage values to create new signal plus noise digital values for each entry into both left and right portions of the topographical number array; sensing how each such iterative step after the entries of selected adjacent rows of the topographical digital numerical array and determining the consequences of each such step able to predict the subsequent step in a way that will produce a converging process in which the next increment is either of the same or opposite polarity and of the same polarity the magnitude and wherein next digital voltage amount is either the same or reduced by factor such as one-half with the overall consequence being that the algebraic sum of the digital steps represent our somewhat equal to a close approximation of the magnitude of the noise for that row or trial except that the overall plus or minus polarity sign for that role will be reversed, thereby yielding a highly precise estimate of the unwanted noise with an ever increasing accuracy as the number of iterations is increased.

71. (Previously Presented): A versatile stand alone antenna and receiving system as set forth in claim 69, in which rapid processing is done at the carrier frequency as represented at an intermediate frequency amplifier which is part of a heterodyned system for the signal, including noise.

72. (Previously Presented): A versatile stand alone antenna and receiving system as set forth in claim 69, wherein processing is performed in each phase group separately to yield a plurality of different corresponding phase angles with these phases multiplied as part of the phase multiplying scheme and because of their different phase displacement simultaneously producing a multiplication of a baseline separation to create an angle resolution ability that can help discriminate against signals from unwanted near by angular directions.

73. (Previously Presented): A versatile stand alone antenna and receiving system comprising:

means for determining an angle of arrival in each of a plurality of phase groups, and multiplying such a digital value with minimal phase dispersal using low noise achieved results of in-phase and quatrature results, such a precise phi result being determined by dividing an overall low noise quadrature result by an overall low noise in-phase result that produces the arc tangical of the angle phi, and with this phase angle being multiplied by integer multipliers so as to create equivalent pseudo-antenna elements without excessive phase dispersion that would have been caused by noise.

74. (Previously Presented): A versatile stand alone antenna and receiving system as claimed in claim 73, further comprising:

means for resolving each of a plurality of synthetic vectors into new low noise in-phase and quatrature components with the sum of these many new components being properly segregated and accumulated in terms of in-phase and quatrature to create a much sharper beam with greatly enhanced capability to detect weaker wanted signals and better discriminate against signals from unwanted directions by virtue of the derived antenna beam patterns.

75. (Previously Presented): A versatile stand alone antenna and receiving system comprising:

means for providing a nearly continuous estimate of a received signal amplitude at, or related to a carrier signal amplitude, wherein processing takes place, the means for providing employs surrogate carrier signals of known values that are substituted for actual signals and which are compared to each of several predetermined values to select one that gives the closest match as determined by an enhanced signal-to-noise ratio that results when alternate plus carrier half cycles match subsequent negative half cycles so as to determine a signal estimated result because these half cycles are inherently the same amplitudes.

76. (Previously Presented): A versatile stand alone antenna and receiving system as claimed in claim 75, further comprising providing the option of duplicating the

system to create multiple probes that operate in parallel so as to minimize time required to select a correct signal probe of the multiprobe process.

77. (Previously Presented): A versatile stand alone antenna and receiving system as claimed in either of claims 76, further performed at the carrier frequency and operable to accommodate rapidly fluctuating received signals.

78. (Currently Amended): A versatile stand alone antenna and receiving system comprising:

means for ~~approximating a unity signal-to-noise condition by employing wider system bandwidth of the receiving system to provide enough additional noise so that it~~receiving a receive signal within a wide system bandwidth, wherein the bandwidth is chosen such that noise having a level substantially equal to the level of the receive signal is permitted to be received automatically into the system; and

means for combining one or more surrogate carrier values with the receive signal; and

means for determining which of the surrogate carrier values is nearest to the level of the receive signal ~~is nearly equal to the signal and with this arrangement resulting in an increased bandwidth to accommodate many more channels in~~

~~communications systems and wherein these conditions provide bandwidth noise that can be processed rapidly using rapidly changing noise samples~~.

79. (Previously Presented): A versatile stand alone antenna and receiving system comprising:

means for searching and acquiring a desired signal in a time synchronization and detection process resulting in synchronization of a timing clock that samples in both in-phase and quadrature analog-to-digital converters so as to establish a system reference phase and thereafter introduce an appropriate sequence of surrogate signal estimates, wherein a typical search involves a set of such surrogate values in which one of them causes a signal to erupt from the background noise so as to create a vastly improved signal-to-noise ratio.

80. (Previously Presented): A versatile stand alone antenna and receiving system comprising:

means for providing a joint signal and noise process of several iterative steps that employs digital values that are successively added algebraically to an array of stored digital information that represents a numerical array of signal-plus-noise digital values used in a preplanned way starting with initial values that are obtained from two or more trials in which each trial consists of random noise values combined with two signal

half cycle values that are essentially equal to each other during these two trials with such equality being achieved by the sampling process used in analog-to-digital conversion in which the sampling as controlled by a system clock is performed for the two successive samples at the same phase, wherein the phase is the phase reference of the system, wherein the values-added are assigned, as signal values, or noise values during the different steps of the overall process and with the steps being independent because the signal does not change the noise nor does noise change the inherent signal.

81. (Currently Amended): A data processing method comprising:

iteratively adding digital values to an array of stored digital information that represents a numerical array of signal-plus-noise digital values, wherein the array comprises initial values that are obtained from two or more trials including random noise values combined with two signal half cycle values that are essentially equal to each other during these two trials <u>because of the repeatabilty of a sinewave carrier</u> and wherein the initial values comprise two or more respective successive samples sampled at the same phase, wherein the phase is the phase reference of the system;

assigning the values added to be signal values or noise values during different iterations of the data processing method; and

processing two or more successive data samples or trials to confirm that an endomorphic process has been achieved such that a combination of trials together provide a frame of information concerning a signal carrier at a rate such that a series of frames accommodate a changing nature or modulation of the carrier.

82. (Currently Amended): An iterative data processing method comprising:

iteratively adding digital values to an array of stored digital information that represents a numerical array of signal-plus-noise digital values, wherein the array comprises initial values that are obtained from two or more trials including random noise values combined with two signal half cycle values that are essentially equal to each other during these two trials and wherein the initial values comprise two or more respective successive samples sampled ~~at~~ with respect to the phase reference of the system~~the same phase, wherein the phase is the phase reference of the system~~;

assigning the values added to be signal values or noise values during different iterations of the data processing method; and

extracting phase modulation data from a carrier signal, wherein the modulation is in the form of a sinusoidal ~~or squarewave~~ pattern between two phase excursions accomplished by a pair of carrier instances that ~~are at the same phase with eachother~~use the same phase reference for a plurality of such pairs which are used

successively to reproduce the modulation from a series of frames of enhanced information.

83. (Currently Amended): A versatile stand alone antenna and receiving system comprising:

a single stand-alone array antenna operable to receive a plurality of overall receive signals;

a processor that receives the overall receive signals and detects and acquires very weak signals without the assistance of a pilot pulse, a diversity receive method or any ~~other apriori~~pre-established information related to signal conditions of the overall receive signals.

84. (Currently Amended): A versatile stand alone antenna and receiving system comprising:

a single stand-alone array antenna operable to receive a plurality of overall receive signals;

a processor that receives the overall receive signals and enhances a detectability and acquisition of useful information related to the receive signals by comparing the respective receive signals to multiple predetermined surrogate values and determining

when the amplitude of the receive signals is closest to one of the surrogate carrier amplitude values.

85. (Previously Presented): A versatile stand alone antenna and receiving system as claimed in claim 84, wherein the respective comparing and the determining of the receive signals in said processor is performed in-parallel with each other to speed up an overall processing time.

86. (New): A method for estimating the strength of a carrier signal in a receive system, the method comprising:

iteratively comparing a series of predetermined surrogate signal amplitudes to the amplitude of the carrier signal; and

detecting a match between one of the predetermined surrogate signal amplitudes and the amplitude of the carrier signal.

87. (New): A method as claimed in claim 86, wherein said iteratively comparing and detecting steps are performed within two or less cycles of the carrier signal.

88. (New): A method as claimed in claim 87, wherein a process of integrating a plurality of different independent signal-plus-noise samples is avoided as unnecessary.

89. (New): A data processing method for removing noise from a noise-plus-data signal received by an antenna, the process comprising:

determining an estimation of an amount of noise resident in each of successive samples of the noise-plus-data signal, wherein the amount of time necessary to determine the estimation of the noise for each sample is equal to the period of a carrier wave of the received noise-plus-data signal; and

subtracting the estimated noise for each sample from the corresponding samples of the noise-plus-data signal to generate a noise-reduced sample,

wherein a constant of integration for the method is bi-polar and tends to average to zero.

90. (New): A method as claimed in claim 87, wherein the two or less cycles of the carrier signal constitute a slight departure from real-time processing and enables processing of a wider bandwidth of received signals in the receive system as compared to the bandwidth of received signals present in systems that utilize at least one of integration processing and real-time processing.

91. (New): A method as claimed in claim 90, further comprising realizing an increase in signal-to-noise ratio due to the processing of the wider bandwidth of received signals.

92. (New): A radar system comprising:

a front-end processing section operable to improve a signal-to-noise ratio of a wideband receive signal, wherein said front-end processing section includes a front-end processor operable to iteratively compare a series of predetermined surrogate signal amplitudes to the amplitude of a carrier signal and detect a match between one of the predetermined surrogate signal amplitudes and the amplitude of the carrier signal; and

a back-end processing section operable improve the signal-to-noise ratio of a narrowband signal derived from an output of said front-end processing section.

93. (New): A radar system as claimed in claim 92, wherein said back-end processing section includes a back-end processor operable to perform at least one of Doppler processing, range-gate processing and Fast Fourier Transform processing.

94. (New): A method of processing signals received by an array of a receiving system, said method comprising:

configuring a numerical array of modified signal-plus-noise values representative of said received signals such that each noise portion of said signal-plus-noise value transitions through zero at a location in the array, said location being determined by the polarity and magnitude of said noise;

sensing how the injection of a programmed iterative value will change a relative location within said array by sensing, in progressive steps, when each injected iterative value causes a match in the numerical values of signal-plus-noise from two rows of the numerical array to be further from, or closer to, a topocentric center of left and right portions of the array; and

sensing iterative changes in a symmetrical fashion in said modified signal-plus-noise values by using plus or minus deviations nearest to the average.

95. (New): A method as claimed in claim 89, wherein an improvement in an amount of entropy is achieved as a result of the reduction in the amount of noise present in the received signal.